

REMARKS:

- 1) Referring to item 10) of the Office Action Summary, please indicate the acceptance of the Formal Drawing Replacement Sheets filed on November 25, 2003.
- 2) The original specification of this application was essentially a literal translation of a corresponding foreign application text. The specification has now been amended in an editorial manner to better meet the formal requirements and typical style of a US application. For example, section headings have been inserted, references to claim numbers in the written description have been avoided, and the like. A few minor editorial corrections and clarifications have been made as well. These editorial and formal amendments do not introduce any new matter. A written description of inventive features originally disclosed in drawing Figs. 3, 4 and 5 has been added to the specification at page 10 line 13, and does not introduce any new matter in view of the original disclosure in the drawings. The Abstract has been rewritten to comply with US standards. Entry of the amendments is respectfully requested.
- 3) The original claims, which were essentially literally translated from corresponding foreign claims, have been amended as follows.

Independent claim 1 has been amended to incorporate features supported in original claims 2 and 17, as well as the disclosure of Figs. 3, 4 and 5.

Claims 2, 17 and 22 have been canceled.

4541/WFF:he

- 12 -

The remaining dependent claims have been amended editorially, for streamlining, and for proper conformance with amended claim 1. Note that the original claims were essentially a literal translation of corresponding foreign claims, and the present editorial and streamlining amendment merely adapts the claims better to typical US claim style, format, and terminology and is not submitted for reasons of patentability.

New claims 23 and 24 have been added. Claim 23 is supported by the original disclosure of Figs. 3 and 4 and the written description at page 15, lines 12 to 14. Claim 24 is supported by original Fig. 1 and the written description at page 10, lines 18 to 24. Thus, the new claims do not introduce new matter.

Entry and consideration of the claim amendments and the new claims are respectfully requested.

- 4) Referring to section 1 on page 2 of the Office Action, the objection to the disclosure has been addressed in the present amendment. The Examiner's detailed suggestions for improving the original literally-translated disclosure are appreciated, and have been taken into account. Please withdraw the objection to the disclosure.
- 5) Referring to section 2 on pages 2 to 3 of the Office Action, the objection to claims 1, 2, 6, 10, 11, 13, 18 to 20 and 22 has been addressed in the present amendment. The informalities pointed out by the Examiner have been corrected or avoided. Accordingly, please withdraw the objection to the claims.

4541/WFF:he

- 13 -

- 6) Referring to section 3 on pages 4 to 5 of the Office Action, the rejection of claims 1 to 22 as obvious over US patent 1,818,469 (Floyd Jr.) in view of GB 198,229 (Ford) is respectfully traversed. Claim 22 has been canceled, and claim 1 is the only remaining independent claim. The rejection will now be discussed with respect to amended claim 1.
- 7) Claim 1 has been amended to emphasize significant distinctions between the invention and the prior art.

A most significant distinction relates to the configuration and structure of the guide elements of each deflecting element of the present muffler.

Each deflecting element comprises a disc-shaped body having radially extending guide elements and radially extending slots therebetween. The guide elements are guide vanes. Each guide vane has a free leading edge along one of the slots and a free trailing edge along another of the slots. Moreover, each one of the slots is formed and bounded between the trailing edge of one guide vane and the leading edge of the next adjacent guide vane of a given deflecting element. Such a configuration of the guide vanes is exemplified and can be clearly seen in Figs. 3, 4 and 5 of the present drawings.

The prior art does not disclose and would not have suggested such a configuration and structural arrangement of guide vanes of a deflecting element.

Further according to present claim 1, the respective sets of guide vanes of successive adjacent deflecting elements are alternately angled at opposite pitch angles so as to deflect the

flow of the gaseous medium alternately in opposite swirl directions. Such alternate pitch angles of the guide vanes of successive deflecting elements are exemplified and can be clearly seen in Figs. 3, 4 and 5 of the present drawings.

The prior art would not have suggested such alternate opposite pitch angles of sets of guide vanes having the present inventive configuration and arrangement.

- 8) Two significant distinctions are evident between the present claimed invention and the muffler according to Floyd Jr.

First, as acknowledged by the Examiner, Floyd Jr. does not disclose the guiding elements deflecting the gas flow in different directions about the main axis of the housing. More particularly in comparison to present amended claim 1, Floyd Jr. does not disclose and would not have suggested alternately oppositely angling the respective sets of guide elements of successive deflecting elements at opposite pitch angles so as to deflect to the flow in alternating opposite swirl directions.

To the contrary, Floyd Jr. discloses that the spiral or swirl direction imparted by the blades (26) of all of the baffle plates (17) should be in the same consistent swirl direction to achieve a consistent spiral whirling motion throughout the muffler chamber. Namely, the inlet jet tube has baffle plates (14) with "a substantially spiral shape from end to end designed to give the gases from the chamber 7 a whirling motion" (page 1, lines 58 to 62). Also, the jet tube (12) has ports (15) that "are designed to be positioned in conformity with the angle and direction of spiral plates (14)" (page 1 lines 98 to 100). This

whirling spiral motion imparted to the gases continues as the gases flow through the openings (28) and impinge the blades (26) of the baffle plates (17) (page 2 lines 1 to 20). From these disclosures, a person of ordinary skill in the art would have found no suggestion to angle the guide elements of successive baffle plates in alternating opposite directions so as to achieve an alternating opposite spiral flow of the gas. Rather, a person of ordinary skill would have been motivated expressly to achieve a consistent uniform spiral whirling flow throughout the entire muffler as taught by Floyd Jr.

Secondly, in comparison to present amended claim 1, Floyd Jr. does not disclose and would not have suggested a configuration and structural arrangement of guide elements as guide vanes that each have a free leading edge and free trailing edge along respective slots, such that each one of the slots is formed and bounded between the free trailing edge of one guide vane and the free leading edge of the next guide vane.

To the contrary, Floyd Jr. discloses each baffle plate (17) having a perimeter flange (18) around the periphery thereof. Each baffle plate (17) is provided with blades (26) which are bent or "struck up" from the planar plate body of the baffle plate and extend outwardly therefrom (page 1 line 69 to 73 and 94 to 97). As can be seen in Figs. 1, 2 and 3 of the reference, the blades (26) are not and would not have suggested guide vanes as presently claimed. Particularly, the blades (26) do not each have a free leading edge along one slot and a free trailing edge along another slot. Instead, the blades (26) only have a free trailing edge that is deflected outwardly from a single slot.

4541/WFF:he

- 16 -

while there is no leading edge. Rather, a leading end portion of the bent blade (26) remains connected to and transitions into the planar disk body of the respective baffle plate (17). Furthermore, the continuous perimeter flange (18) of the baffle plate (17) remains intact and connected around the entire perimeter of the baffle plate.

It is expected that the through-flow restriction produced by the baffle plates according to Floyd Jr. would have been significantly higher than the through-flow restriction (i.e. "back pressure") produced by the present deflecting elements having guide vanes as presently claimed. Also, the swirling flow produced according to Floyd Jr. would have been significantly less pronounced than according to the present invention, due to the significant structural differences of the formation of the guide elements. It appears that the muffling function to be achieved according to Floyd Jr. follows a different principal, i.e. a baffling principal to a significant extent, in comparison to the alternating or reversing swirl principal of the present invention.

- 9) The Examiner has turned to the Ford reference for an alleged suggestion toward providing guide elements of a muffler to deflect the flow in different directions, in combination with the above discussed basic teachings of Floyd Jr. Nonetheless, significant distinctions remain between the present invention and a combined view of the references.

It is true that Ford discloses an arrangement of plural baffles (D) spaced from one another along a length of a muffler,

whereby each baffle has a plurality of slits that are "knocked up" or bent to open the slit and form a protruding blade, angled in a direction to impart a spiral or rotating flow direction to the gas flow (page 1, lines 20 to 25). The successive baffles can be arranged to impart an alternating or reversing direction of rotation of the gas flow at each baffle (e.g. page 1 lines 52 to 55). However, such teachings are directly contrary to the above discussed teachings of Floyd Jr. relying on a uniform consistent swirling flow throughout the entire muffler to achieve the intended purposes of Floyd Jr. A person of ordinary skill, when faced with two contrary teachings in two references, would not have been in a position to follow a first reference's teachings in combination with the directly contrary teachings of a second reference. Thus, a person of ordinary skill in the art would not have been motivated to combine such reversing spiral flow teachings of Ford with the remaining teachings of Floyd Jr., because they are incompatible rather than supplemental or improving on one another.

Even if the teachings Ford would have been considered to make a drastic modification of the Floyd Jr. muffler, the present invention would still not have been suggested. Most importantly in this regard, the presently claimed configuration and structural arrangement of guide elements as guide vanes would not have been suggested.

Very similar to the bent-up guide blades accordingly to Floyd Jr. (as discussed above), the guide blades according to Ford are each also formed in that "one wall of each slit may be knocked up" or "one side of each slit is knocked up to open up

a slit" (page 1, lines 20 to 21 and 40 to 42, emphasis added). It is absolutely clear that the guide blades formed according to Ford do not have and would not have suggested a configuration of guide vanes that each have a free leading edge along one slot and a free trailing edge along another slot, so that each slot is formed and bounded between the trailing edge of one guide vane and the leading edge of the next guide vane. Also see Fig. 1 of Ford, in which the guide blades are clearly formed simply by knocking-up or bending-up one side of each slit (and see page 2 lines 41 to 43). Thus, the guide blades according to Ford do not have a free leading edge and a free trailing edge along two respective slots, but rather only have one free edge formed by bending out from a single slit, while the opposite edge area remains connected and transitions into the flat planar disc body of the baffle plate. Also, the baffle plates (D) of Ford further include the continuous connected peripheral flange (D2) extending continuously around the perimeter of the baffle plate (page 2 lines 34 to 37).

The teachings of Ford and Floyd Jr. regarding the configuration and structure of each baffle plate with its bent-up guide blades is consistent with each other, and significantly different from the present inventive configuration. Just as with Floyd Jr., the baffle plate structure according to Ford would provide significantly greater flow resistance or back pressure, and a significantly worse spiraling effect than the presently claimed arrangement of guide vanes.

Thus, even a combination of the teachings of Ford and Floyd Jr. would not have suggested the presently claimed configuration and structural arrangement.

- 10) The Examiner has further generally asserted (with regard to claims 6 and 7) that *"it would have been an obvious matter of design choice to employ guiding elements comprising a structural configuration as those comprised by pump's impellers or fan's propellers because this configuration would create a more predominant swirl effect that would help move out the gaseous medium from the muffler in a quicker manner"* (middle of page 5 of the Office Action). This assertion is respectfully traversed also with regard to the guide vane configuration of present amended claim 1.

It is respectfully submitted that the Examiner's proposed motivations in this regard appear to be based on a hindsight reasoning with an understanding of the present invention in mind, because such motivations would not have been provided by any pertinent prior art of record.

The present invention is not directed to an active pump or an active fan. Rather, the present invention is directed to a passive muffler. A muffler does not use pump impellers or fan propellers. For example, the impellers of a pump or the propellers of a fan are rotating elements that actively drive a fluid flow, in contrast to the present fixed guide elements that merely passively guide a fluid flow.

There are no suggestions or motivations provided by the pertinent prior art of record, that fixed guide elements of an

exhaust gas muffler should have the guide vane configuration as presently claimed for achieving any pertinent purpose or improvement. Any teachings that allegedly might apply to active pump impellers and active fan propellers would not have been applicable in the context of a person of ordinary skill in the art trying to further develop an exhaust gas muffler.

- 11) For the above reasons, the invention of present claim 1 would not have been obvious over the prior art. The dependent claims recite additional features that further distinguish the invention over the prior art, for example as follows.

Claim 5 recites that the pitch angle of the guide elements is alternately positive and negative respectively on successive ones of the deflecting elements. Floyd Jr. discloses nothing about opposite pitch angles, and Ford discloses not that the guide blades should be bent with a negative pitch angle to an opposite side of the baffle disk. Instead, in Fig. 1 of Ford, it appears that the guide blades on both baffles are bent out toward the right, i.e. on the same side of the baffle plate, and thus with the same (e.g. positive) pitch angle relative to the plane of the baffle plate, just in opposite spiral directions. This is significant in connection with the single-edged bent configuration of the blades in comparison to the inventive guide vanes.

Present claims 6 and 7 define features whereby each one of the guide vanes or guiding elements is twisted in itself, for example so that it is more sharply angled at its radially outer end than its radially inner end. Such a twisted configuration

would not have been suggested and is not even possible with the bent-out or "knocked-up" single-edge structure of the guide blades according to Ford and Floyd Jr. Regarding the Examiner's assertion about pump impellers and fan propellers, such uncited prior art of active rotating fluid-moving machines would not have been relevant in the context of fixed guide vanes of passive mufflers. The Examiner is requested to cite pertinent prior art references if such can be found.

Contrary to present claim 9, the guiding elements according to the prior art do not each respectively have a form of a sector of a circular ring. A sector of a circular ring necessarily has two radially extending edges, which is not true of the single-edge bent blades according to the references.

Claim 21 has been amended to recite the muffler "for and in connection with" the internal combustion engine of a model aircraft. The mufflers according to the prior art are not disclosed or suggested as being particularly suited to the small internal combustion engine of a model aircraft.

- 12) For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 1 to 22 as obvious over Floyd Jr. in view of Ford.
- 13) Referring to section 4 on page 6 of the Office Action, the additional prior art made of record requires no particular comments because it has not been applied against the claims.

- 14) New dependent claim 23 makes clear that each vane is connected to a hub only at a radially inner root end of the vane, and is otherwise not connected to the other vanes in a given deflecting element. This feature is directly contrary to the teachings of both references, regarding a continuous perimeter flange that remains connected around the entire periphery, as well as a portion of each bent blade remaining connected to the planar baffle plate disk along the entire radial extent of the blade.
- 15) New dependent claim 24 recites that at least a portion of the housing chamber forms a calming section for calming the gaseous medium, whereby this calming section is hollow and unoccupied by the deflecting elements. The references do not particularly disclose such an express calming section.
- 16) Favorable reconsideration and allowance of the application, including all present claims 1, 3 to 16 and 18 to 24, are respectfully requested.

Respectfully submitted,
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Enclosures:
Term Extension,
Form PTO-2038

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4541/WFF:he

- 23 -